

BOOKS RECEIVED

A MANUAL OF STYLE—A compilation of typographical rules governing the publications of The University of Chicago, with specimens of types used at the University Press, Seventh Edition, 300 pages, size of page 5 x 7½, Price \$1.50, November, 1920, The University of Chicago Press, Chicago, Ill.

Contents: Rules for Composition (capitalization, the use of Italics, quotations, spelling, punctuation, divisions, footnotes, indexing, tabular work). Technical Terms. Appendix (hints to authors, to proofreaders, to copyholders, proofreaders' marks). Specimens of Types. Index.

The first edition was issued in 1906, having been compiled from proofreaders' notes "jotted down by the first proofreader at odd moments for his own guidance; added to from year to year as opportunity offered or new necessities arose; revised and re-revised as the scope of the work, and, it is hoped, the wisdom of the workers increased—it emerges in its present form, . . . the blended product of the reflections of many minds."

The fourth edition (1913) was entitled, "A Manual for Writers, Covering the needs of authors for information on rules of writing and practices in printing."

A book has recently been issued by *The Atlantic Monthly* of the same size page and covering the same subjects, the result of a similar evolution.

MEDIZINISCHE PSYCHOLOGIE, Ein Leitfaden für Studium und Praxis, von Dr. Ernst Kretschmer, Privatdozent für Psychiatrie in Tübingen. Leipzig, 1922, Georg Thieme Verlag—size 5 x 8, 306 pages.

ANXIETY HYSTERIA, Modern View on Some Neuroses, by C. H. L. Rixon, M.D., M.R.C.S. and D. Matthew, M.C., M.B., Ch.B., with a Foreword by Col. Sir A. Lisle Webb, 124 pages, 4¼ x 7¼, price \$1.50, Paul B. Hoeber, New York, 1921.

SEPARAT-ABDRUCK aus der Zeitschrift für Morphologie und Anthropologie, Band XXII, Heft 1 und 2. Der Menschenfuss von Dr. Franz Weidenreich, a.o. Prof. der Anatomie z. Z. Mannheim. Stuttgart, 1921. E. Schweizerbart'sche Verlagsbuchhandlung. Size 6½ x 9½, 282 pages.

Resumen por John L. Bremer, por el autor, Kikuo Okamoto.

Un estudio de las venas superficiales de la extremidad superior
en sujetos japoneses vivos.

El presente trabajo es una descripción de las venas superficiales del brazo en una serie de 200 varones japoneses, habiéndose notado diversos tipos de variaciones. Comparadas con cuadros de variaciones semejantes encontradas en europeos, puede notarse un tanto por ciento distinto de diferencias.

Translation by José F. Nonidez
Cornell Medical College, New York

A STUDY OF THE SUPERFICIAL VEINS IN THE SUPERIOR EXTREMITY OF LIVE JAPANESE

KIKUO OKAMOTO

Anatomical Institute of the Keio University, Tokyo, Japan

TEN FIGURES

A study of the superficial veins in the superior extremity of live subjects is important for intravenous injection in practice. With this object, I have examined the superficial veins in the superior extremity of live Japanese. A similar investigation we have already seen in the paper of Richard J. A. Berry and his student, H. A. S. Newton.¹ But this study of Japanese is not without interest for the anatomy of the race. I shall be very happy if this study proves of service to the angiology in Japanese, which is now in the hands of my teacher, Prof. Dr. B. Adachi (Kyoto).

The subjects of my study were one hundred men. Eighty of these were students of the Medical Department of the Keio University and twenty were my friends, for which I express my sincere gratitude for their kindness. The procedure adopted, as Berry and Newton used, was the usual one of keeping the limbs in a dependent contraction and then banding the distended veins.

A. The v. cephalica (B.N.A.)

In the paper of Berry and Newton we seen the v. cephalica arising as a direct communication of the radial end of the arcus venosus dorsalis manus. But in my case I have found it arising from the v. metacarpea dorsalis I by the rete venosum dorsale manus. Of the proximal course of this vein occur three types.

¹ Richard J. A. Berry and H. A. S. Newton. A study of the superficial veins of the superior extremity in 300 living subjects. *Anat. Anz.*, Bd. 33, 1908.

Type 1. The *v. cephalica* curves round the radial border of the forearm proximal to the processus styloideus of the radius on the volar surface. Here the vein continues to pass proximally and slightly medially to the bend of the elbow, where it gives off the *v. mediana cubiti*. Continuing its proximal course, the *v. cephalica* runs in the sulcus bicipitalis lateralis and then in the trigonum deltoideopectorale to its termination. This first type in my description has no accessory cephalic vein and no 'Inselbildung.' I have found this type in 19 per cent in my cases (21 per cent on the right, 17 per cent on the left).

Type 2. The *v. cephalica* has a so-called 'Inselbildung' in its course. Berry and Newton did not describe such a type in their paper, but they described it in the *v. cephalica accessoria* which originated from the *v. cephalica* itself. They found this type in 16 per cent of cases in Europeans. I have found this in 27 per cent in Japanese (31 per cent on the right, 23 per cent on the left).

Type 3. The *v. cephalica* with an accessory vein (the *v. cephalica accessoria* B.N.A.). This accessory vein is a second longitudinal vessel situated laterally on the forearm, which opens into the main cephalic vein. In this case the main cephalic vein lies somewhat more medially than in the case without this vein. In Europeans Berry and Newton found this in no less than 80 per cent, but in Japanese I have found only 43 per cent (47 per cent on the right, 39 per cent on the left).

The termination of the *v. cephalica* was constant. Cases where the *v. cephalica* turned medially across the distal third part of the arm to terminate in the *v. basilica*, as described in the paper of Berry and Newton, were not found in my subjects. But cases in which the branchial portion of the cephalic vein was very weak were found in 4.5 per cent in my case (2 per cent on the right, 7 per cent on the left). In every instance Berry and Newton found the cephalic vein arising as a direct continuation of the radial end of the arcus venosus dorsalis manus. In my case it was abnormal in 6 per cent (5 per cent on the right, 7 per cent on the left). The cephalic vein arose from the ulnar end of the arcus venosus dorsalis manus or the rete venosum dorsale manus and the radial end of the arcus or the rete passed proximally to

the forearm and terminated in the v. basilica in the elbow flexure. In these cases the v. mediana antibrachii terminated in this abnormal vein. The cephalic vein received a large oblique vein (v. obliqua) from the ulnar end of the arcus venosus dorsalis manus in 41 per cent of my cases. The connection between the v. cephalica and the deep brachial vein in the elbow flexure was found relatively rare in live subjects. I have found this only in five cases (two cases on the right, three on the left) in 200 subjects. In this case the v. cephalica usually did not give off the v. mediana cubiti. The v. mediana cubiti was absent also in 14.5 per cent (10 per cent on the right, 19 per cent on the left) of my cases. The abnormal reduplication of the cephalic vein was found only in one case (no. 26, student twenty-two years) (see Abnormalities).

B. The v. basilica (B.N.A.)

The course of this vein is remarkably constant. As regards the normal origin of this vein, I have observed that it arose from the v. metacarpea IV or the ulnar end of the arcus venosus dorsalis manus. In 44 per cent (44 per cent on the right, 44 per cent on the left) the v. mediana antibrachii terminated in this v. basilica, which is in agreement with the figures of Berry and Newton (43 per cent in their case). The termination of the v. basilica in my subjects was constant (i.e., perforated the fascia brachii in the sulcus bicipitalis medialis). The type mentioned by Carle,² where this vein terminated in the v. axillaris, was not found in my cases. Very rare variation of this vein is of some interest in the making of 'Inseln' in its course. I have observed this only in two cases out of 200 arms (all were in the right arm). The other variations appeared in two cases (one on the right, one on the left), where the basilic vein was very weak. But in this case the v. cephalica accessoria, arising from the ulnar end of the rete venosum dorsale manus, was very strong in compensation.

² Carle, Recherches sur la veine basilique. Application à la ligature de l'axillaire. Bull. et Mém. soc. anat. Paris, Année 75, Sér. 6, T. 2.

C. The v. mediana cubiti (B.N.A.)

This is the connecting vein which normally leads obliquely upward in the flexure of the elbow from the v. cephalica to the v. basilica and has an anastomosis with the deep veins. This vein was present in 85.5 per cent (89 per cent on the right, 82 per cent on the left), which corresponds with the study of Berry and Newton (84 per cent in their case). The cases where the v. mediana antibrachii terminated in the v. mediana cubiti were much more frequent than in Europeans. In 54.5 per cent (56 per cent on the right, 53 per cent on the left) I have found these types (43 per cent in Europeans, after Berry and Newton). The vein arose from the v. cephalica much more distally than usual in 3 per cent (on the right side only one case and on the left six cases). I have observed sometimes the abnormalities of the reduplication of this vein, i.e., in 8.5 per cent (10 per cent on the left, 7 per cent on the right). Absence of this vein was found much more often than its reduplication, i.e., in 14.5 per cent in my cases (11 per cent on the right, 18 per cent on the left).

D. The v. mediana antibrachii (B.N.A.)

The v. mediana antibrachii is found to be the main outlet of the rete venosum volare manus. It passes proximally along the ulnar side of the volar surface of the forearm to a variable termination in the vicinity of the elbow-joint. Sometimes it makes a loop in the vicinity of the v. mediana cubiti, which receives the v. mediana antibrachii. The termination of this vein in my case is as follows:

1. It terminated in the v. basilica, 44 per cent (44 per cent on the right, 44 per cent on the left).
2. It terminated in the v. mediana cubiti, 54.5 per cent (56 per cent on the right, 53 per cent on the left).
3. It terminated by dividing into the v. mediana basilica and the v. mediana cephalica only in two cases in my 200 subjects. This type was usually described as an M-shaped arrangement of the veins in front of the elbow.

4. It terminated in a loop which lies in the vicinity of the v. mediana cubiti. Each end of this loop opened in to the v. mediana cubiti or the ulnar one in the v. basilica, 13.5 per cent (16 per cent on the right, 11 per cent on the left).

E. The veins on the dorsal side of the hand

From the union of every pair of the arcus venosus digitalis arise four larger vv. metacarpeae dorsales. These form sometimes the rete venosum dorsale manus as in B.N.A. and sometimes the arcus venosus dorsalis manus as noted by Berry and Newton. The large vein passing from the center of the concavity of the arcus venosum dorsale manus proximally to terminate into the v. cephalica or the v. basilica is called the v. ascendens. The radial extremity of the arcus or of the rete venosum dorsale manus receives vv. digitales propriae of the index-finger, as well as both the similar veins of the pollux. The large vein issuing from the ulnar end of the arcus venosus dorsalis manus and passing obliquely proximally and radially to terminate in the v. cephalica is called the v. obliqua. In my case I have the result as follows:

1. The arcus dorsalis venosus manus, 70 per cent (75 per cent on the right, 65 per cent on the left).
2. The rete venosum dorsale manus, 30 per cent (25 per cent on the right, 35 per cent on the left).
3. Presence of the v. obliqua, 41 per cent (44 per cent on the right, 38 per cent on the left).
4. Presence of the v. ascendens, 27.5 per cent (23 per cent on the right, 32 per cent on the left).

F. Abnormalities

The abnormalities in the superficial veins of the superior extremity in my studies were as follows:

1. The reduplication of the v. mediana cubiti was found in 8.5 per cent (7 per cent on the right, 10 per cent on the left).
2. The v. mediana cubiti was absent in 14.5 per cent (11 per cent on the right, 18 per cent on the left).

3. Connection between the *v. cephalica* and the *v. cephalica accessoria* was found in 2.5 per cent (3 per cent on the right, 2 per cent on the left).

4. The *v. cephalica* did not give off the *v. mediana cubiti* in 14.5 per cent (10 per cent on the right, 19 per cent on the left).

5. The *v. cephalica* arose from the ulnar end of the *arcus venosus dorsalis manus* or the *rete venosum dorsale manus* and the radial end of the *arcus* or the *rete* passed proximally to the forearm and terminated in the *v. basilica* in the elbow flexure. In these cases the *v. mediana cubiti* was sometimes absent and the *v. mediana antebrachii* terminated in this abnormal vein. I have found this abnormality in 6 per cent (7 per cent on the right 5 per cent on the left).

6. The connection between the *v. cephalica* and the *v. mediana antibrachii* was found in 4.5 per cent (4 per cent on the right, 5 per cent on the left).

7. The *v. cephalica* was very weak in 4.5 per cent (2 per cent on the right, 7 per cent on the left). This abnormality combined often with abnormality 5. The absence of the brachial portion of the *v. cephalica*, which was found by Berry and Newton, was not seen in my cases.

8. The abnormal connection between the *v. basilica* and the *v. cephalica* in the upper arm was found in 3 per cent (2 per cent on the right, 4 per cent on the left).

9. The loop in the *v. mediana antebrachii* was found in 13.5 per cent (16 per cent on the right, 11 per cent on the left).

10. In case no. 61 (student twenty-five years) I have observed a very rare abnormality. The *v. cephalica* arose from the ulnar side of the *rete venosum dorsale manus* and ran proximally and terminated in the *trigonum deltoideopectorale*. In the right arm, the radial end of the dorsal veins of the hand arose normally and in the middle of the upper arm turned obliquely to the *fossa axillaris* and the terminated in the *v. axillaris*. In the left arm the *v. cephalica* at the fore margin of the *m. pectoralis major* gave off an abnormal branch to the axillary vein.

11. In case no. 26 (student twenty-two years) the v. cephalica in the right arm was duplicated. The lateral one arose from the v. ascendens.

12. In case no. 87. (student twenty-five years) I have found two loops in the flexure of the elbow in the left arm, in which vv. medianae antibrachii terminated.

PLATE 1

EXPLANATION OF FIGURES

1 No. 3 Twenty-four years old, right arm. The v. cephalica with 'Inselbildung.'

2 No. 11 Twenty-three years old, right arm. The v. basilica with 'Inselbildung.' The v. cephalica accessoria is present.

3 No. 29 Twenty-three years old, left arm. The duplication of the v. mediana cubiti is present.

4 No. 87 Twenty-five years old, right arm. The v. mediana antibrachii makes a loop in the vicinity of the elbow flexure.

5 No. 87 Twenty-five years old, left arm. The v. mediana antibrachii makes double loops.

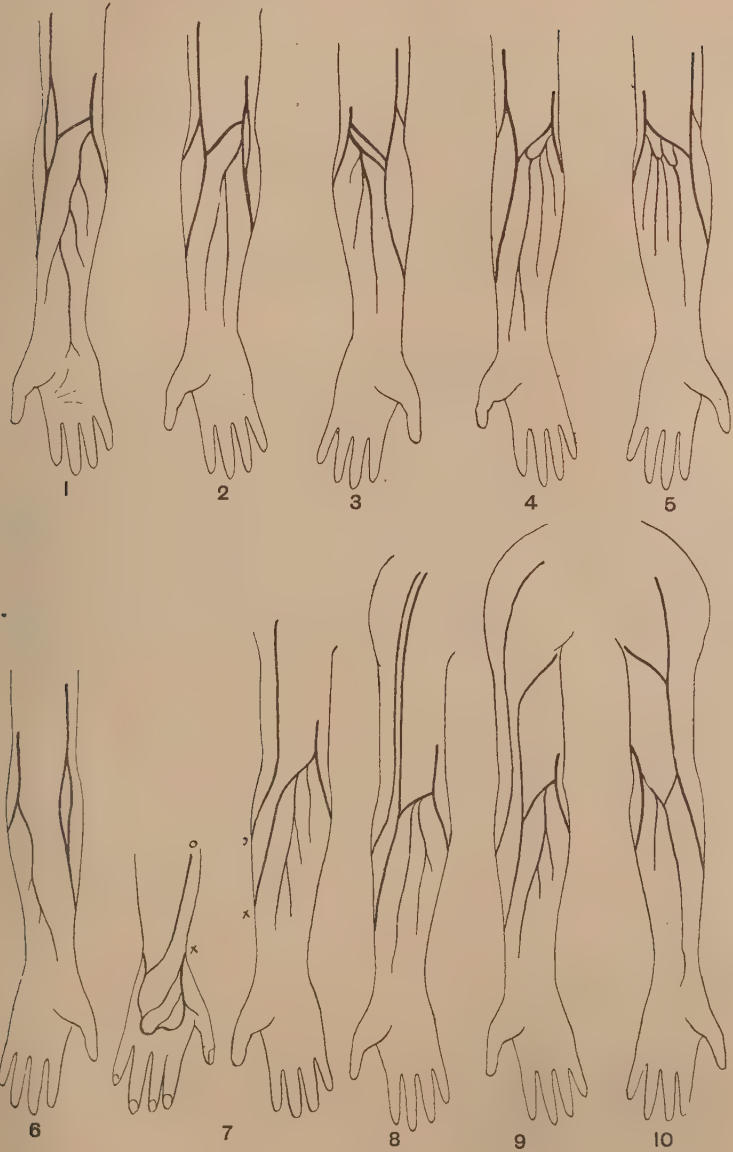
6 No. 53 Twenty-six years old, left arm. The v. mediana cubiti is absent and the v. cephalica makes an 'Insel.'

7 No. 50 Twenty-five years old, right arm. The radial origin of the v. cephalica terminates in the v. basilica and the ulnar origin (corresponds with the accessorial origin) runs to the normal termination.

8 No. 26 Twenty-two years old, right arm. The reduplication of the v. cephalica is present, but the lateral one arises from the ulnar side of the dorsal veins of the hand.

9 No. 61 Twenty-five years old, right arm. The v. cephalica arises from the radical side of the dorsal veins of the hand and terminates in the v. axillaris. The lateral one arises from the ulnar side of the dorsal veins of the hand, and runs to the normal termination.

10 No. 61 Twenty-five years old, left arm. The v. cephalica gives an abnormal branch to the v. axillaris at the proximal third part of the upper arm. The v. mediana antibrachii divides into the v. mediana cephalica and the v. mediana basilica.



Resumen por el autor, William W. Looney.

Una vena espermática interna derecha aberrante.

En un sujeto mejicano, de unos veinticinco años de edad, fallecido de tuberculosis, ha encontrado el autor una vena espermática derecha aberrante la cual penetraba dentro de un hilus secundario situado cerca del polo inferior del riñón derecho, en compañía de una arteria renal accesoría, terminando en un vaso tributario de la vena renal. La relación de los vasos renales era también inversa de la normal.

Translation by José F. Nonidez
Cornell Medical College, New York

AN UNUSUAL ABERRANT RIGHT INTERNAL SPERMATIC VEIN

WILLIAM W. LOONEY

Department of Anatomy, College of Medicine, Baylor University, Dallas, Texas

ONE FIGURE

The following observation was made on a Mexican male, about twenty-five years old, who died in Parkland Hospital of tuberculosis and was dissected during the first term of the present school year.

After the small intestine had been dissected and removed together with the mesentery, the peritoneum was stripped from the right psoas muscle. The right internal spermatic vessels were exposed just above the brim of the pelvis and traced upward. In following the vessels towards their origin and termination, it was found that the vein, instead of following the course of the artery, diverged to the right in the direction of the kidney.

On exposure of the hilus and lower pole of the right kidney, an accessory renal artery was found entering a distinct secondary hilus near the inferior pole of the kidney, accompanied by the internal spermatic vein. After removing a small portion of the anterior surface of the kidney (fig. 1), the internal spermatic vein was found to enter one of the tributaries of the renal vein.

It will also be noted from the figures that the ordinary relation of the renal artery and vein was reversed in this particular case.

Our recent texts and journals report cases in which the right internal spermatic vein enters the right renal vein, but none of them mentions cases parallel with the one described above.

Evidently, during differentiation of the kidney, the internal spermatic vein was included in the surrounding kidney substance and maintained in this position, thereby causing it to

terminate in a tributary of the renal vein, instead of in the main renal vein, as is ordinarily found in such cases.

It is interesting to note that had this particular kidney been removed during life, serious results would have followed in the right testicle, without the surgeon's being necessarily to blame.

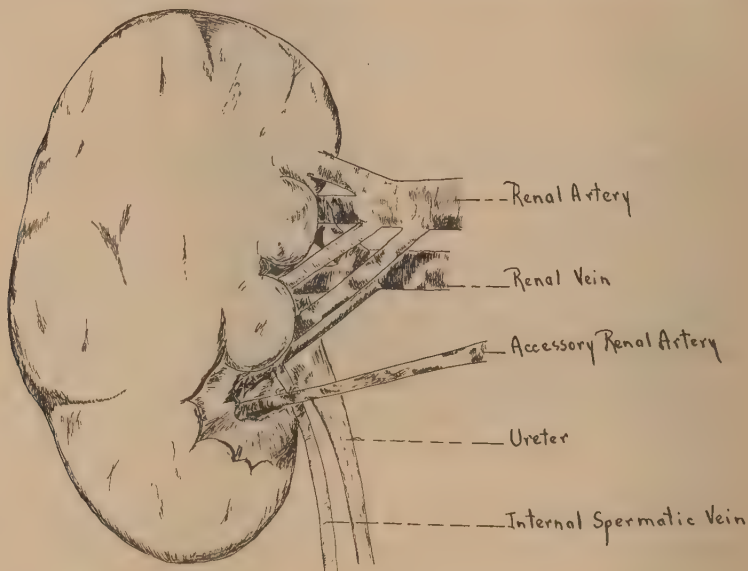


Fig. 1 Right kidney, with a portion near the lower pole cut away to show secondary hilus, accessory renal artery, and internal spermatic vein joining a tributary of the renal vein.

Resumen por el autor, George L. Streeter.

Algunas características uniformes de la oreja de los primates.

La parte articular, porción de la oreja destinada a su inserción a los lados de la cabeza, es una de las partes menos variables de la oreja de los primates. En general la parte articular corresponde a la mitad superior de la concha y comprende: a) Las eminencias articulares superior e inferior; b) la espina del helix; c) el pedunculo del helix. Las eminencias articulares superior e inferior ofrecen reunidas una superficie de inserción, en contacto directo con el cráneo. Están separadas por un pliegue de refuerzo el cual visto de lado se proyecta como el pliegue principal entre la fosa articular superior e inferior (fossa triangularis y cymba conchae) correspondiendo a las eminencias. El pedúnculo del helix forma el borde antero-lateral de la parte articular. Por encima soporta al helix y se continúa con él; por debajo marca la transición de la parte articular y la parte inferior de la concha.

Translation by José F. Nonidez
Cornell Medical College, New York

SOME UNIFORM CHARACTERISTICS OF THE PRIMATE AURICLE

GEORGE L. STREETER

Carnegie Embryological Laboratory, Baltimore, Maryland

FOURTEEN FIGURES

In the attachment of the auricle to the side of the head there are certain physical requirements that must be met. The auricle must, of course, be held securely in place and at the same time it must possess a varying degree of motility and power of direction; its shape must be maintained for the efficient collection of sound vibrations, and provision must be made by some closure device to protect the external acoustic meatus from the entrance of foreign substances, particularly in burrowing and aquatic animals. In studying the striking differences in structure exhibited by the auricle in the various animal forms, one finds that most of their auricular individualities are in the nature of remarkable morphological adaptations to these varying physical requirements. Perhaps the most constant requirement is that the auricle be securely attached. In consequence one would expect to find that portion of the auricle concerned in this function to be less variable in form than its other parts. This appears to be true, at any rate for the Primates, and it is the purpose of this communication to call attention to this relatively constant articular provision and its expression in the form of the auricle.

The existing terminology of the external ear is a purely descriptive one and is based upon the form usually met with in the human adult. During the period of its inauguration scant attention was given to the embryonic stages and as little to the ear of other animals. It is therefore not surprising that one finds it more or less inadequate for any functional analysis of

the auricle or for the study of any ear other than that of adult man. When an appropriate time comes the nomenclature of the external ear, as much as any other part of the body, will need a thorough reconsideration. For the present, I am departing very little from the prevalent terminology, and then only where it seems unavoidable. As can be seen in figure 2, the following substitutions have been made: *fossa articularis superior* (for *fossa triangularis*), *fossa articularis inferior* (for *cymba concha*), *plica principalis* (for *crus inferius anthelicis*),¹ and *crus helicis* to include all that part of the helix derived from the mandibular arch. Furthermore, on the median side of the cartilage, corresponding to the articular fossae, there are the superior and inferior articular eminences, partially separated by the groove of the principal fold. It is to these eminences that I would first of all direct the reader's attention.

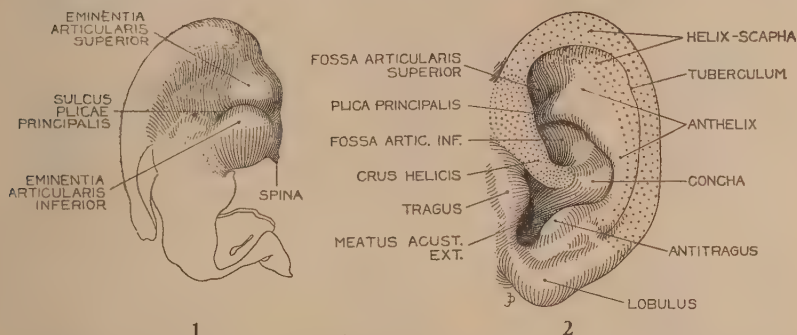
The two articular eminences (fig. 1) are continuous with each other anteriorly and together constitute a relatively rigid, bowl-shaped base from which the auricle is suspended. It is only this part of the auricular cartilage that offers a contact surface suitable for its attachment to the skull, and it may therefore be designated as the *pars articularis*. Nearly the whole of the inferior eminence contributes to this surface, whereas, of the superior eminence, only the forward and lower portions take part. It is true that the band-like, fenestrated cartilage surrounding the external acoustic meatus also has a bony attachment, but this is quite different in character and is to be compared rather to the tracheal rings, serving as a mechanism to prevent a collapse of the meatus. In structure and position it offers little if any support to the auricle.

The articular eminences are attached to the periosteum by a fibrous ligament sufficiently loose to permit free movement of the auricle. The extrinsic ear muscles are attached around the margins of the eminences. The superior auricular muscle is inserted into the superior eminence, the posterior auricular muscle into the conchal wall immediately adjoining the inferior

¹ I am adopting the term *plica principalis* as used by Boas (Ohrknopel und äusseres Ohr der Säugetiere. Kopenhagen, 1912).

eminence, while the anterior auricular muscle is inserted at the base of the spina. It is to be noted that the spina is in reality a process of the pars articularis, from that portion where the inferior articular eminence merges into the crus helices.

As for the crus helices, this is not, strictly speaking, a part of the helix, from which it differs both embryologically and structurally, as I have pointed out elsewhere.² It merges with the helix as a continuous fold, but one can always recognize the point of junction of the two at about the level indicated in

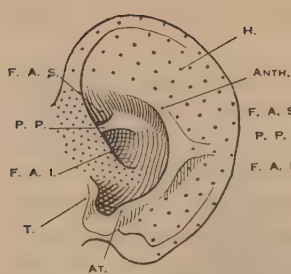


Figs. 1 and 2 Human adult auricle. In figure 1 the auricular cartilage is viewed from the median side, showing the two eminences that constitute its main area of contact with the skull. In figure 2 can be seen the cavities (fossae articulares) of these eminences with the plica principalis projecting between them as a strengthening ridge. The articular fossae are continuous with and constitute a specialized part of the concha, the pars articularis. The crus helices and the cartilaginous spina are also parts of this attachment mechanism.

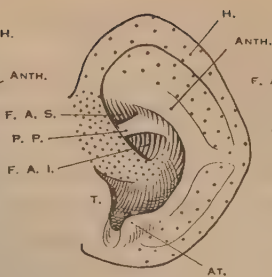
figure 2. The crus helices constitutes, first of all, the lateral rim of the bowl-shaped pars articularis and only secondarily acts as a support to the anterior end of the helix.

So much can be readily seen in the adult ear. In the human embryo and fetus the entity of a pars articularis is even more pronounced. It is the first part of the auricular cartilage to acquire its distinctive form and is more or less bowl-shaped from the outset, forming a cap over the upper end of the first

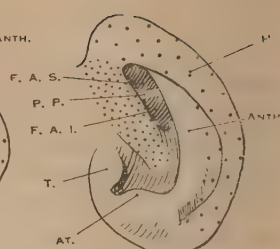
² Streeter: Embryological significance of the crus helices. *Anat. Rec.*, vol. 18, 1920.



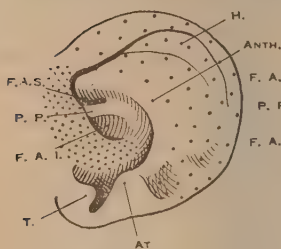
3. Chimpanzee



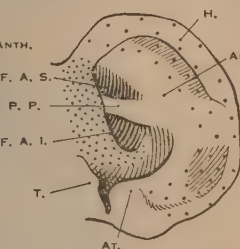
4. Gorilla



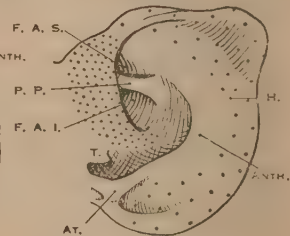
5. Orang-utan



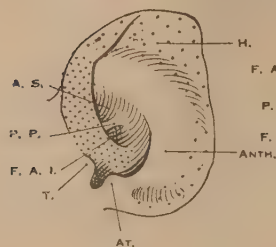
6. Gibbon



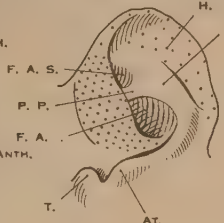
7. Proboscis-monkey



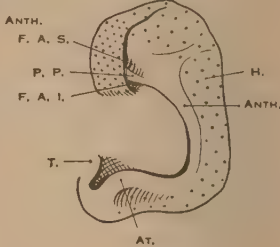
8. Macaque



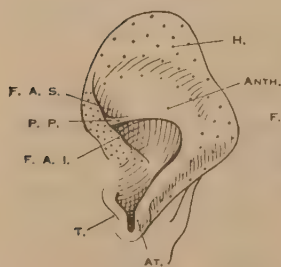
9. Baboon



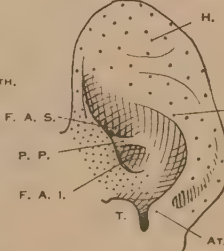
10. Spider-monkey



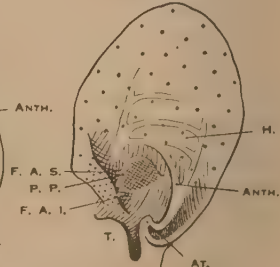
11. Howler



12. Marmoset



13. Lemur



14. Tarsius

Figures 3 to 14

gill cleft. It has a marked oral process (spina) extending forward into the mandibular arch and its lateral rim (crus helicis) is well defined. The floor, projecting against the skull, is early subdivided into two fossae by the plica principalis, which can be recognized in the 43-mm. fetus and is well pronounced in 50-mm. specimens. That portion of the floor corresponding to the inferior articular eminence is relatively larger, as compared with that of the superior, than obtains in the adult. The pars articularis is directly continuous with the concha and unquestionably should be considered a part of it. The latter spreads down towards the region of the antitragus and the meatus. In embryos less than 30 mm. long this portion of the concha is still fenestrated, which condition is more marked and remains permanent in the region of the meatus. The presence of the scapha, with its characteristic rolled edge (helix) is indicated early, but is relatively small and its growth slow until the later fetal stages.

Turning from these considerations to a survey of the auricle of other Primates, we find a striking constancy in the form of that portion concerned in its attachment—the pars articularis. A representative series of Primates is shown in figures 3 to 14. For convenience in arrangement, these figures are drawn at about the same size and so are at different enlargements. This treatment tends to minimize the marked differences in size actually prevailing in the scapha and helix in these different forms, and

Figs. 3 to 14 In these sketches the helix and scapha are dotted and the crus helicis is indicated by closer dots. Abbreviations: *ANTH.*, anthelix; *AT.*, antitragus; *F.A.I.*, fossa articularis inferior (cymba concha); *F.A.S.*, fossa articularis superior (fossa triangularis); *H.*, helix and scapha; *P.P.*, plica principalis (crus inferius antheliceis); *T.*, tragus. Most of these sketches were made from preserved specimens kindly lent to me by Dr. Adolph H. Schultz, and the species as identified by him are herewith given. (In the four specimens obtained elsewhere the source is mentioned.) Figure 3, *Troglodytes niger*, copied from figure V, page 214, of Boas ('12); figure 4, *Gorilla gorilla*, from photograph issued by the New York Zoological Society; figure 5, *Pongo pygmaeus*; figure 6, *Hylobates concolor*; figure 7, *Nasalis larvatus*; figure 8, *Pithecius philippinensis*; figure 9, *Papio porcarius*; figure 10, *Ateles variegatus*; figure 11, *Alouatta seniculus*; figure 12, *Hapale rufimanus*, copied from figure 243, Tafel 23, of Boas ('12); figure 13, *Lemur variegatus*; figure 14, *Tarsius spectrum*, from specimen belonging to Dr. H. Woollard.

at the same time tends to give the impression of a greater variation in size in the other parts than really exists. In contrast to the variable scapha and helix, the parts composing the pars articularis (crus helicis, superior and inferior fossae, and the principal fold) exhibit about the same form and relations in each figure.

The principal fold is a little more variable in size than the other parts of the attachment mechanism, although its relations are essentially the same in each case. Where it is particularly well marked it comes to the level of and fuses with the rim of the concha (anthelix), as usually occurs in man. It was this relation which led to the term 'crus inferius anthelicis.' Where it is not so well developed it does not reach the conchal brim and is thus not continuous with the anthelix. Certainly, in most Primates one cannot properly speak of it as a crus of the anthelix. Since the figures show the chief points that I wish to bring out, it will not be necessary to describe them here individually. It may, however, be well to call attention to the *Tarsius* specimen³ as the most discordant one in the series. One of its peculiarities is the extraordinary development of what appears to be the principal fold. Instead of constituting a simple strengthening ridge, the fold projects from the conchal floor as a free flap, somewhat of the nature of a similar structure seen in certain bats.

In view of the above observations, we can briefly analyze the form of the primate auricle somewhat as follows: The auricle consists of a primary part (concha), a rigid, shell-like support which is relatively constant in form, and a secondary part (scapha-helix-lobule) which flares from the caudal rim (anthelix) of the concha and is exceedingly variable both in size and form.

The concha in turn may be subdivided into a lower half (cavum conchae), which serves as an approach to the meatus and at the same time provides a closure mechanism by the specialization of its antero-inferior walls, and an upper half

³ For the privilege of studying this valuable specimen I am indebted to Dr. H. Woollard, of University College, London.

(pars articularis), which constitutes an attachment base from which the auricle as a whole is suspended.

The pars articularis comprises several elements, all of which contribute to its effectiveness. *a)* The superior and inferior articular eminences offer jointly an attachment surface which comes in direct contact with the skull. These eminences are separated by a groove or strengthening fold which in a lateral view projects as the plica principalis, separating the two fossae that correspond to the eminences. *b)* The spinous process (spina) offers a point for ligament and muscle insertion. *c)* The crus helcis forms the anterolateral rim of the pars articularis, its upper end supporting and merging into the helix. Below, it marks the transition of the pars articularis into the lower part of the concha. Including, as we thus do, the pars articularis in the concha, the so-called superior crus of the anthelix becomes simply the upper end of the anthelix, or, in other words, the superior rim of the concha.

Resumen por el autor, Ferdinand C. Lee.

Sobre los vasos linfáticos de la pared de la aorta torácica del gato.

En vista de los escasos conocimientos sobre la irrigación linfática de las paredes de las arterias, el autor publica sus observaciones sobre un ejemplar que indica que en la aorta del gato existe un plexo extenso de capilares linfáticos situado entre las tunicas media y adventicia, mientras que más superficialmente, en la última, existe un plexo de grandes vasos linfáticos los cual es a veces se anastomosan con el plexo situado más profundamente. El ejemplar descrito es un gato en el cual se llevó a cabo la ligadura intratorácica del conducto torácico. Tres semanas después de la operación el animal fué sometido a la acción del éter, inyectando los linfáticos del mesenterio con una solución acuosa saturada de azul de Berlin. La masa de inyección penetró en el torrente circulatorio a través de una conexión linfático-venosa e incidentalmente llenó algunos de los linfáticos de la pared de la aorta.

Translation by José F. Nonidez
Cornell Medical College, New York

ON THE LYMPHATIC VESSELS IN THE WALL OF THE THORACIC AORTA OF THE CAT

FERDINAND C. LEE

Anatomical Laboratory of the Johns Hopkins University

TWO FIGURES

During the course of an investigation involving the intra-thoracic ligation of the thoracic duct of the cat (4), a specimen was obtained which showed to some extent the distribution of lymphatic vessels in the wall of the thoracic aorta. Since the lymphatics of blood-vessels are as yet imperfectly understood, it was considered that the specimen justified this brief report.

The specimen was obtained from an adult male cat whose thoracic duct was ligated according to a method previously described. The animal made an uneventful recovery from the operation, gained slightly in weight, and twenty-one days following the ligation was sacrificed in the following manner. While under the influence of ether, the abdomen was opened and the mesenteric lymphatic vessels were injected with a saturated aqueous solution of Berlin blue, using an ordinary hypodermic syringe with a needle of 28 G. After about 20 cc. of the suspension had been injected, the animal was sacrificed. It was immediately seen that the thoracic duct had been securely ligated, that a lymphaticovenous connection had become established between the thoracic duct and the ninth left intercostal vein, and that a plexus of vessels containing the injection mass existed in the wall of the aorta. The entire trunk of the animal was fixed in 10 per cent formalin, and a few days later a block of tissue containing the lower half of the thoracic aorta and the surrounding tissues was dissected away, dehydrated in alcohol, and cleared according to the Spalteholz method.

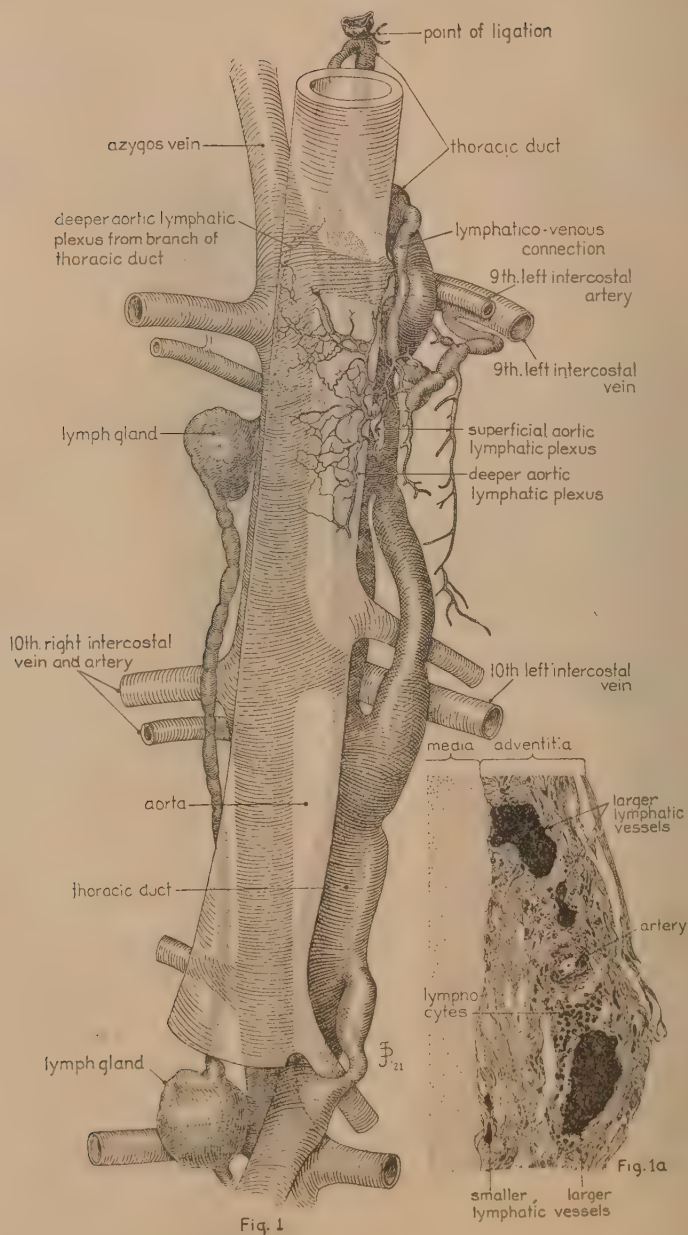


Figure 1 is a drawing of this specimen as viewed anteriorly. It shows the thoracic duct passing along the thoracic aorta and being pierced, as it were, by successive intercostal arteries. Below the point of ligation the thoracic duct suffers a limited plexiform change, and then, immediately above the ninth left intercostal artery, it gives off a vessel which courses inferiorly and after making several turns goes superiorly and empties into the ninth left intercostal vein. From this lymphaticovenous connection, which possesses numerous valves, vessels come off to form a more superficial and a deeper plexus; the superficial portion in the periadventitial tissue has only a few branches (not striped in the drawing) which communicate at one point with the deeper aortic plexus lying well within the adventitia of that vessel. The lymphaticovenous channel also gives off several branches which course inferiorly in the loose periaortic tissue. The structure of interest is the deeper aortic plexus, which lies definitely in the adventitia; the depth to which it pierces the wall of the aorta is shown in figure 1a. The larger vessels of this plexus have a few valves and soon break up into a rich capillary plexus which extends well over to the right side of the aorta. This capillary plexus lies at the junction of the adventitia and media of that vessel; no branches were seen to pass into the media.

The thoracic duct also gives off a branch, on the right side, posterior to the aorta (fig. 2). This branch courses inferiorly and just before reaching a lymph gland gives off several branches, one of which continues to go inferiorly, while the other branches form a small plexus of capillary vessels, situated also at the junction of the adventitia and media, and extending in a semicircular shape superiorly until it communicates with the thoracic duct. The branch of the thoracic duct leading to the lymph gland is double for a part of its lower course and is abundantly provided with valves. The fine capillary plexus arising in part from this vessel resembles the capillary plexus from the lymphaticovenous connection both in shape and location. These two plexuses approach each other closely at one point, and although the injection shows no continuity between the two, nevertheless a

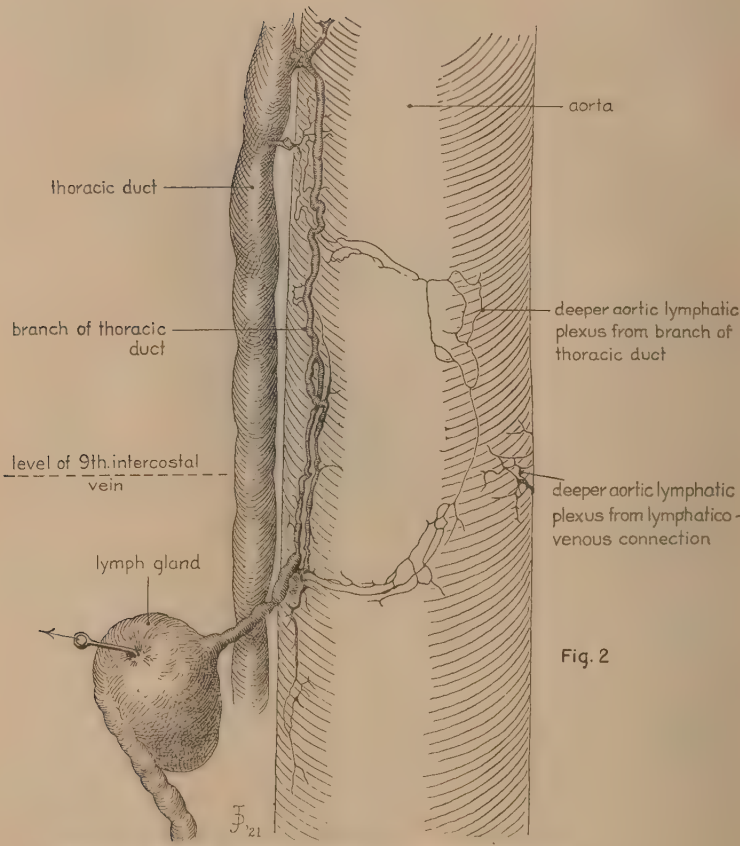


Fig. 2

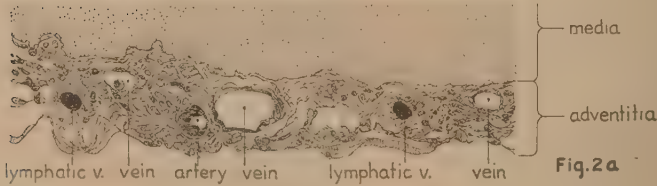


Fig. 2a

small uninjected capillary, discernible with great difficulty, seems to connect one plexus with the other. Along the deeper aortic plexus arising from a branch of the thoracic duct, as shown in figure 2, other vessels, uninjected and paler than the surrounding medium, are seen to course parallel with the lymphatic vessels. These pale uninjected vessels are vasa vasorum and are shown in cross-section in figure 2a.

DISCUSSION

Very little is known about the lymphatic vessels in the walls of vessels. Stroganow (7) undoubtedly was dealing with tissue spaces and not true lymphatic vessels in the work which he reported in 1876. Hoggan and Hoggan (3) in 1883, using the silver-nitrate and gold-chloride method in staining the vascular endothelium of the horse, concluded that no lymphatics exist on the inner side of vessel musculature, whether this musculature be in arteries, veins, or large lymphatic trunks, and that only in those large veins or lymphatics in which the muscular coat is absent is there a plexus of lymphatics immediately underneath the lining endothelium.

In 1897 Schiefferdecker (6), using silver lactate, prepared specimens from the pig's aorta that showed a lymphatic plexus directly under the endothelium. Thus he supplemented the work of Hoggan and Hoggan, who found a subendothelial lymphatic plexus only in those vessels in which the muscular coat was absent.

Delamere (2) in 1904, in his classical treatise on the lymphatics stated that the "existence of arterial lymphatics, however probable, is still a mooted point." Bartels (1) in 1909, in his well-known work on the lymphatic system, did not give any new facts concerning the arterial lymphatics.

It is thus obvious that any light which may be thrown on the subject of arterial lymphatics must be of value. It is at once recognized that the specimen here described was obtained from an animal which was subjected to certain operative procedures to its thoracic duct, and from that point of view does not represent a specimen from a strictly normal animal. However, it does give an idea of the general distribution and arrangement

of arterial lymphatics. It shows that the lymphatics to the aorta form not only a superficial, less evident plexus situated in the peripheral portion of the adventitia, but that deeper in the vessel wall, at the junction of the adventitia and media, an extensive capillary lymphatic plexus exists. The larger branches of this deeper lymphatic plexus run parallel with the vasa vasorum of the bloodstream, thus giving the familiar vascular triad of artery, vein, and lymphatic. It also demonstrates how the smallest injected lymphatic capillary is eventually connected with the thoracic duct, without the interposition of a lymph gland (cf. Bartels (1)).

The determination of the exact character of the plexus arising from the lymphaticovenous connection proper is of importance. Whether this vessel that connects the thoracic duct with the ninth intercostal vein is a lymph vessel or a vein is difficult to decide. Yet the fact that this connecting vessel is tortuous, has so many valves, and gives off vessels which have valves makes one inclined to call it a lymph vessel. And besides it is difficult to consider it a vein because it joins the thoracic duct almost at right angles, whereas ordinarily the typical entrance of a lymph vessel into a vein (e.g., the entrance of the thoracic duct into the junction of the subclavian and internal jugular veins), is such that the lymph vessel makes an acute angle with the vein, and the direction of the current in these two vessels is essentially the same. This arrangement of course facilitates the aspiration of the lymph into the vein. But the direction of the current in the lymphaticovenous connection is opposite to that in the thoracic duct; it thus becomes increasingly difficult to look upon this connecting vessel as a vein. On the other hand, the connecting vessel joins the ninth intercostal vein in such a way that the direction of their respective currents is about the same. The presence of numerous valves in this connecting vessel argues strongly against its interpretation as a vein, because veins of such a small caliber rarely have valves (Schäfer (5)), and if they do have valves, these would probably not be as numerous as the ones in the lymphaticovenous connection.

Granted that the lymphaticovenous connection is essentially a lymph-vessel, then the plexus of vessels which comes from this connection must also be considered lymphatic in character. But, although there are indications of valves in the larger branches of the plexus, nevertheless this entire plexus gives the impression of being venous in character.

As much as one may doubt the lymphatic nature of the plexus communicating with the lymphaticovenous connection, one is all the more sure of the true lymphatic character of the small plexus of vessels in the posterior portion of the aorta. This plexus of vessels communicates only with definite lymphatic trunks, and is therefore definitely lymphatic in character. The finer divisions of this plexus resemble in general appearance and lie at the same depth as the finer vessels of that plexus derived from the lymphaticovenous connection. Unfortunately, no injected vessel was seen to establish the continuity between these two plexuses.

It is a pleasure to thank Mr. J. F. Didusch for the excellent illustrations.

SUMMARY.

In view of the meager knowledge of the lymphatic supply to the walls of arteries, a specimen is reported here which shows that in the aorta of the cat an extensive plexus of lymphatic capillaries lies at the junction of the media and the adventitia, while more superficially in the adventitia there is a plexus of large lymphatic vessels which occasionally anastomose with the plexus more deeply situated.

BIBLIOGRAPHY

- 1 BARTELS, P. Das Lymphgefäßsystem, in v. Bardeleben Handbuch der Anatomie des Menschen, Bd. 3, Abt. 4.
- 2 DELAMERE, G., POIRER, P., AND CUNEO, B. 1904 The lymphatics. Trans. by Leaf. W. T. Keener & Co., Chicago.
- 3 HOGGAN, GEORGE, AND HOGGAN, FRANCES ELIZABETH. 1883 The lymphatics of the walls of the larger blood-vessels and lymphatics. Jour. Anat. and Physiol., vol. 17, no. 1.
- 4 LEE, F. C. 1922 The establishment of collateral circulation following ligation of the thoracic duct. Johns Hopkins Hosp. Bull., vol. 33, no. 21.
- 5 SCHÄFER, E. A. 1912 Microscopic anatomy. Longmans, Green & Co.
- 6 SCHIEFFERDECKER 1897 Die Ernährung der Blutgefäßwandung und die Lymphbahnen derselben. Sitzbr. d. Niederrh. Gesellsch. f. Nat. u. Heilk., Bonn, Jan. 18, B. 2.
- 7 STROGANOW, N. A. 1876 Recherches sur l'existence de canaux lymphatiques dans la tunique interne de l'aorte de l'homme. Arch. de Physiol., Ser. 2, T. 1, no. 3, p. 335.